Adult Immunization Update 2014

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National Center for Immunization and Respiratory Diseases

21st Annual Arizona Immunization Conference

April 2014

Take Out Your Cell Phone

- You will have the opportunity to text answers to questions!
- Please note: message and data rates may apply

Disclosures

- JoEllen Wolicki is a federal government employee with no financial interest or conflict with the manufacturer of any product named in this presentation.
- The speaker will discuss the off-label use of Tdap, pneumococcal conjugate, and zoster vaccines.
- The speaker will not discuss a vaccine not currently licensed by the FDA.

Recommended Adult Immunization Schedule—United States - 2014

Note: These recommendations must be read with the footnotes that follow containing number of doses, intervals between doses, and other important information.

Figure 1. Recommended adult immunization schedule, by vaccine and age group[1]

VACCINE ▼ / AGE GROUP ▶	19-21 years	22-26 years	27-49 years	50-59 years	60-64 years	≥ 65 years
Influenza [2,*]	1 dose annually					
Tetanus, diphtheria, pertussis (Td/Tdap) [3,*]	Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs					
Varicella [4,*]	2 doses					
Human papillomavirus (HPV) Female [5,*]	3 doses					
Human papillomavirus (HPV) Male [5,*]	3 doses					
Zoster [6]					1 dose	
Measles, mumps, rubella (MMR) [7,*]	1 or 2 doses					
Pneumococcal 13-valent conjugate (PCV13) [8,*]	1 dose					
Pneumococcal polysaccharide (PPSV23) [9,10]	1 or 2 doses					1 dose
Meningococcal [11,*]	1 or more doses					
Hepatitis A [12,*]	2 doses					
Hepatitis B [13,*]	3 doses					
Haemophilus influenzae type b (Hib) [14,*]	1 or 3 doses					

*Covered by the Vaccine Injury Compensation Program

For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection; zoster vaccine recommended regardless of prior episode of zoster

Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indication)

No recommendation

Report all clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at www.vaers.hhs.gov or by telephone, 800-822-7967.

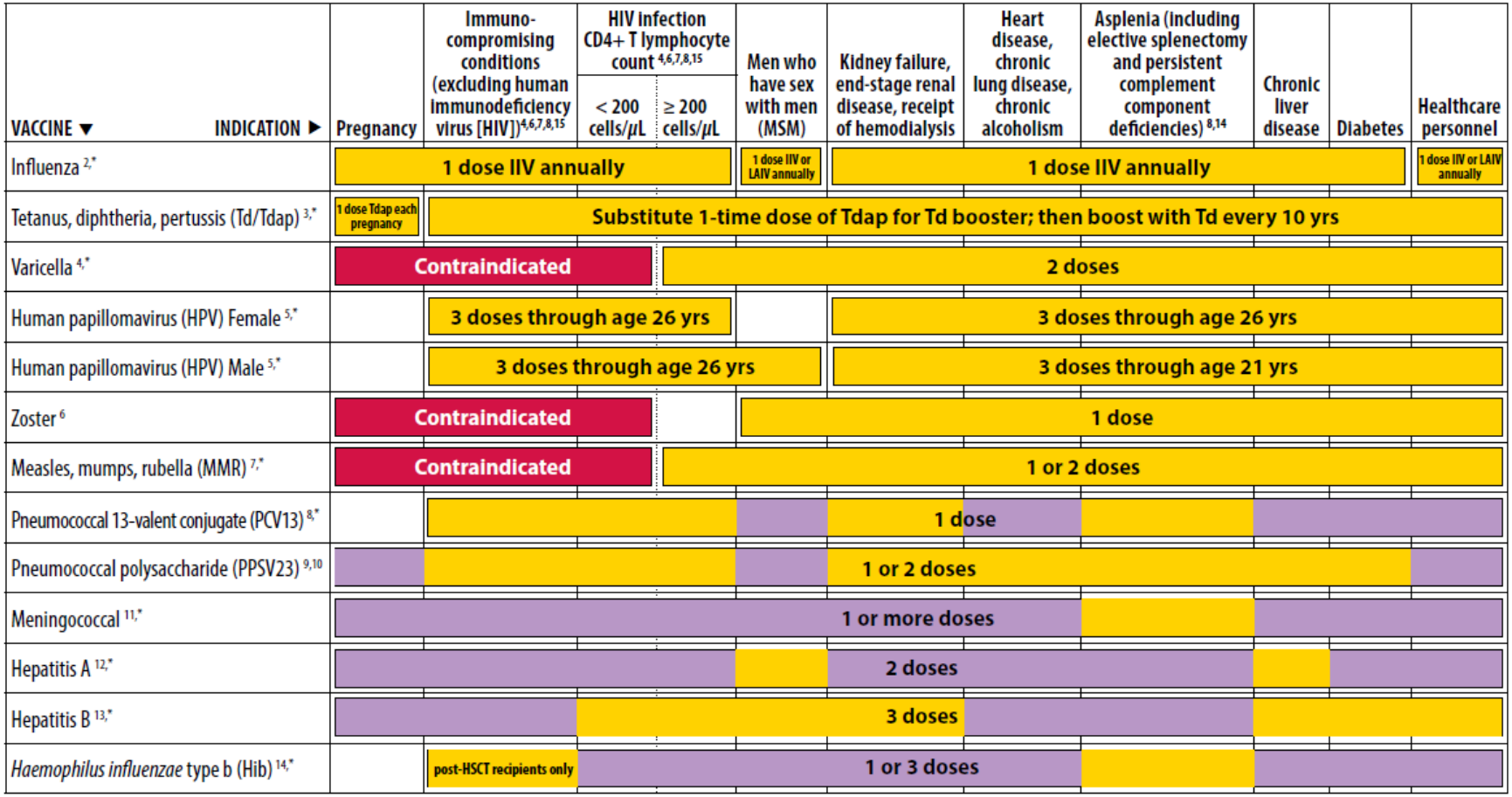
Information on how to file a Vaccine Injury Compensation Program claim is available at www.hrsa.gov/vaccinecompensation or by telephone, 800-338-2382. To file a claim for vaccine injury, contact the U.S. Court of Federal Claims, 717 Madison Place, N.W., Washington, D.C. 20005; telephone, 202-357-6400.

Additional information about the vaccines in this schedule, extent of available data, and contraindications for vaccination is also available at www.cdc.gov/vaccines or from the CDC-INFO Contact Center at 800-CDC-INFO (800-232-4636) in English and Spanish, 8:00 a.m. - 8:00 p.m. Eastern Time, Monday - Friday, excluding holidays.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

The recommendations in this schedule were approved by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), American College of Obstetricians and Gynecologists (ACOG) and American College of Nurse-Midwives (ACNM).

Figure 2. Vaccines that might be indicated for adults based on medical and other indications[1]



*Covered by the Vaccine Injury Compensation Program

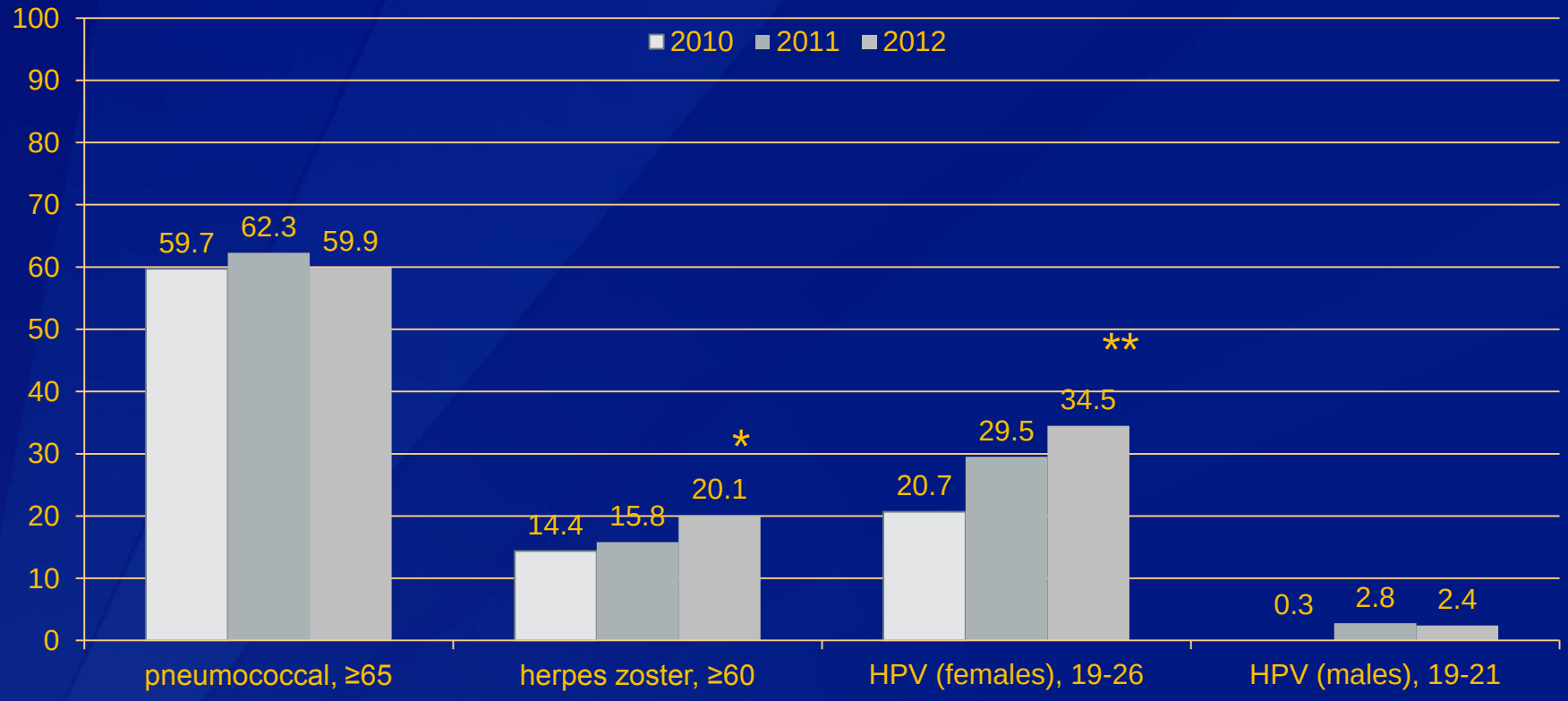
- For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection; zoster vaccine recommended regardless of prior episode of zoster
- Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications)
- No recommendation

These schedules indicate the recommended age groups and medical indications for which administration of currently licensed vaccines is commonly indicated for adults ages 19 years and older, as of February 1, 2014. For all vaccines being recommended on the Adult Immunization Schedule: a vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Licensed combination vaccines may be used whenever any components of the combination are indicated and when the vaccine's other components are not contraindicated. For detailed recommendations on all vaccines, including those used primarily for travelers or that are issued during the year, consult the manufacturers' package inserts and the complete statements from the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/pubs/acip-list.htm). Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

ADULT IMMUNIZATION COVERAGE

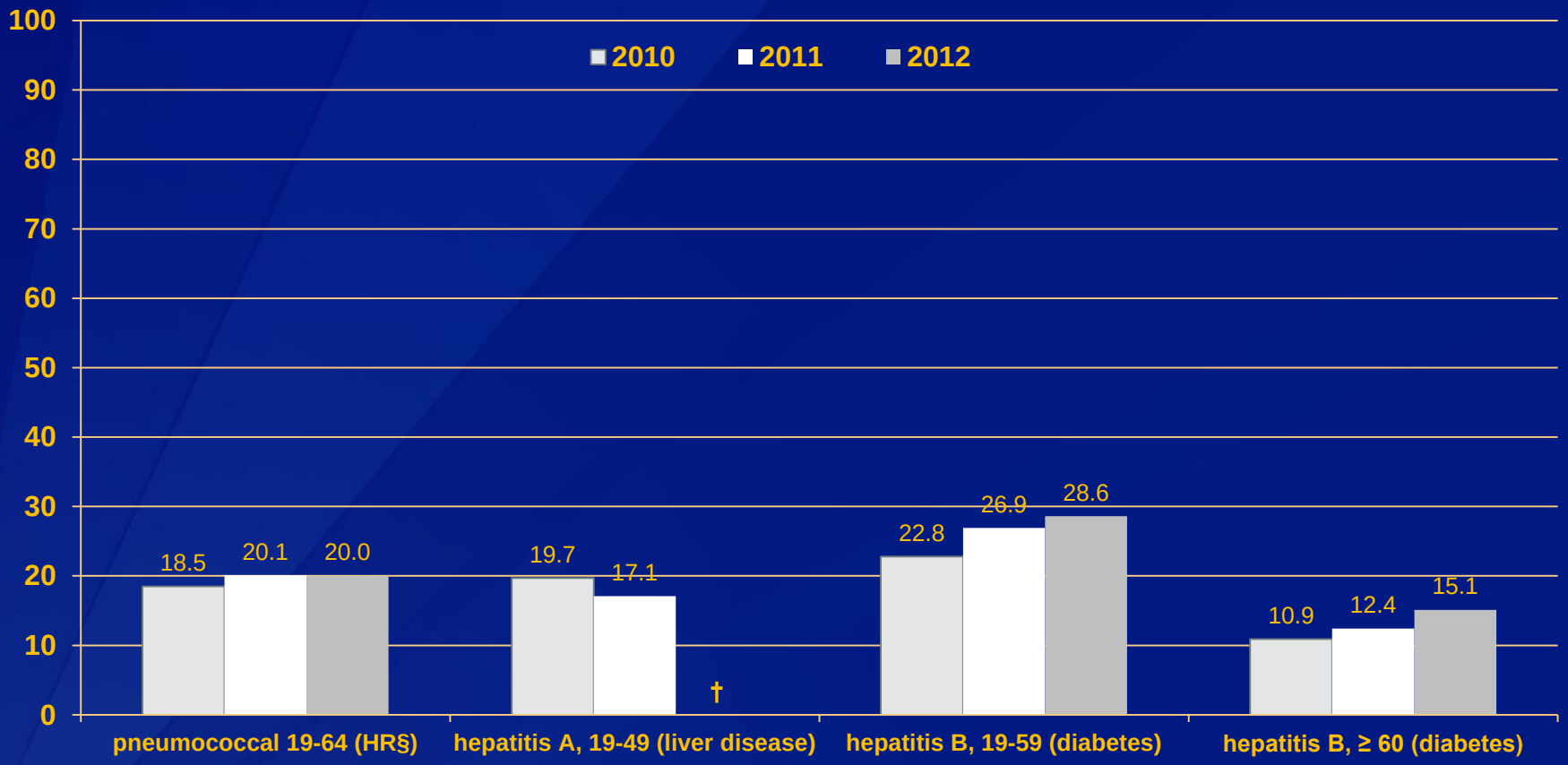
Vaccination Coverage For Age-Based Vaccines, NHIS 2012 – United States



*** +4.4% difference from 2011-2012, p<0.05 by T test for comparisons**
**** +5.0% difference from 2011-2012, p<0.05 by T test for comparisons**

CDC, MMWR 2014: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6305a4.htm.

Vaccination Coverage Among High-Risk Groups, NHIS 2012 – United States



High Risk (HR) – Individuals] ever been told by a health professional they had diabetes, emphysema, chronic obstructive pulmonary disease, coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding nonmelanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or were current smokers.

† Estimate is not reliable due to relative standard error (standard error/estimates) >0.3

From 2014 MMWR at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6305a4.htm.

Adult Immunization Practice Standards

- **Calls to action for healthcare professionals**
  - Assess immunization status of all patients in every clinical encounter
  - Strongly recommend vaccines that patients need
  - Administer needed vaccines or refer to a provider who can immunize
  - Document vaccines received by patients, including entering immunizations into immunization registries
- **Communication resources developed by CDC**
  - Media outreach products
  - Patient education materials
  - Resources and tools for healthcare professionals
- **Many resources from immunization partners**

Framework
Adult Immunization Practice Standards

All Providers

- Incorporate IZ needs assessment into every clinical encounter.
- Recommend, administer needed vaccine, or refer to a provider who can immunize.
- Stay up-to-date on immunization recommendations and educate patients.
- Ensure providers and their staff are up-to-date on their own vaccines
- Understand how to access registries.

Non-immunizing Providers

- Routinely assess immunization status of patients, recommend needed vaccines, and refer patient to an immunizing provider.
- Establish referral relationships with immunizing providers.
- Follow up to confirm patient receipt of recommended vaccine(s).

Immunization Providers

- Observe and adhere to professional competencies regarding immunizations.
- Assess immunization status in every patient care and counseling encounter and strongly recommend needed vaccines.
- Ensure receipt of vaccination is documented.

Framework
Adult Immunization Practice Standards

Professional Healthcare-related Organizations/ Associations/Healthcare Systems

- Educate and train members, including trainees.
- Provide resources and assistance to implement protocols, immunization practices, immunization assessment, etc.
- Encourage members to be up-to-date on own immunizations.
- Assist members in staying up-to-date on IZ info and recommendations.
- Partner with other immunization stakeholders to educate the public.
- Seek out collaboration opportunities with other immunization stakeholders.
- Collect and share best practices.
- Advocate policies that support adult immunization standards.

Public Health Departments

- Determine community needs and capacity and community barriers to adult IZ.
- Support activities and policies to increase vaccination rates and reduce barriers.
- Ensure professional competency.
- Collect, analyze, and disseminate data.
- Conduct outreach and educate public and providers.
- Work to decrease disparities.
- Increase registry access and use.
- Develop billing capacities.
- Ensure preparedness and communicate vaccine information to providers and to the public.
- Promote adherence to laws and regulations pertaining to immunizations.

ACIP IMMUNIZATION RECOMMENDATIONS FOR SPECIFIC VACCINES

Seasonal Influenza Vaccination

Influenza Vaccination Coverage Among Adults: 2011-12 and 2012-13 Seasons

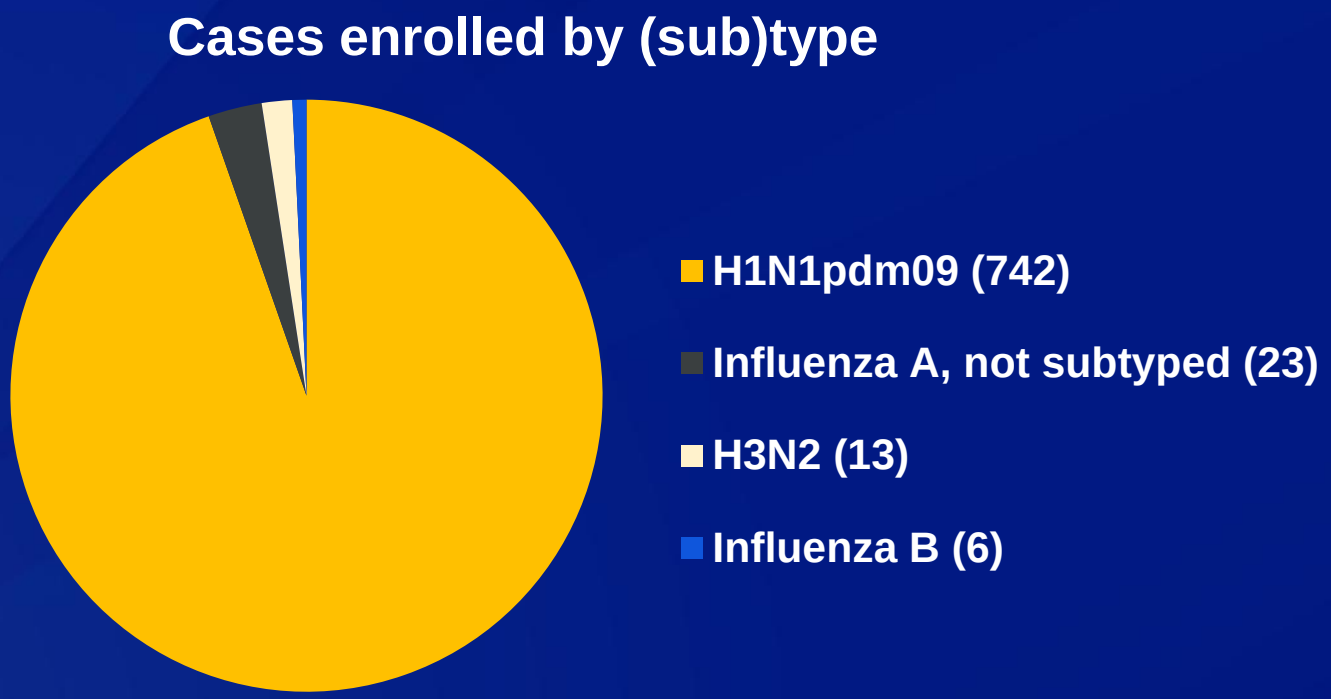
Group	2011-12 (%)	2012-13 (%)	Difference (%)
Persons ≥ 18 yrs	38.8	41.5	+2.7*
Persons 18-49 yrs, all	28.6	31.1	+2.5*
Persons 18-49 yrs, high-risk	36.8	39.8	+3.0*
Persons 50-64 yrs	42.7	45.1	+2.4*
Persons ≥ 65 yrs	64.9	66.2	+1.3*

* Statistically significant difference, $p<0.05$

http://www.cdc.gov/flu/fluvaxview/index.htm.

U.S. Flu VE Network: Results

- 2,319 enrolled from Dec 2, 2013–Jan 23, 2014
- 1,535 (66%) influenza RT-PCR negative
- 784 (34%) influenza RT-PCR positive



Conclusions

- **2009 H1N1pdm virus predominated among influenza viruses identified from Dec 2, 2013-Jan 23, 2014 in U.S**
- **Interim adjusted VE against H1N1pdm09 associated medically attended ARI = 62% (95% CI: 53-69)**
  - Similar for all age groups
  - Similar to VE estimates for H1N1pdm09 from previous seasons
  - Consistent with laboratory data for current season
- **Final analyses for 2013-14 season will investigate effects of prior vaccination**

Influenza Vaccine Strains 2014-15

- **No change from last year's vaccine strains**
- **Trivalent vaccine will contain:**
  - A/California/7/2009 (H1N1)pdm09-like virus
  - A/Texas/50/2012 (H3N2)-like virus
  - B/Massachusetts/2/2012-like virus
- **Quadrivalent vaccine contains the same three strains as in trivalent vaccine plus:**
  - B/Brisbane/60/2008-like virus

Influenza Vaccines for 2014-15

- **Inactivated (IIV3)**
  - Age indications vary by product, formulation, and presentation
  - Intramuscular or intradermal injection
  - Trivalent (A/H3N2, A/H1N1, B [Yamagata])
  - Duration of immunity 1 year or less
- **Inactivated (IIV4)**
  - Age indications vary by product and presentation
  - Intramuscular injection
  - Quadrivalent (A/H3N2, A/H1N1, B [Yamagata], B [Victoria])
  - Duration of immunity 1 year or less
- **Live, attenuated vaccine (LAIV4)**
  - Intranasal
  - Quadrivalent (A/H3N2, A/H1N1, B [Yamagata], B [Victoria])
  - Duration of immunity at least 1 year

www.cdc.gov/mmwr/pdf/rr/rr6207.pdf

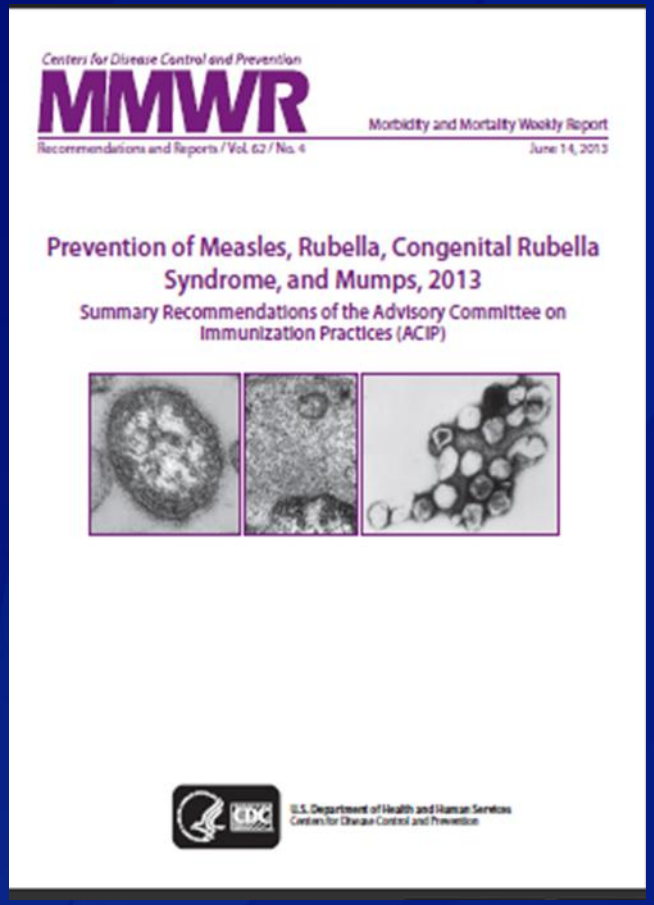
Choice of Influenza Vaccine

- The choice should primarily be driven by the age indication, contraindications, and precautions
- Where more than one type of vaccine is appropriate and available, ACIP has no preferential recommendation for use of any influenza vaccine product over another
  - Quadrivalent vs trivalent
  - High-dose vs standard dose
  - IIV vs LAIV in any age group for whom either is indicated

http://www.cdc.gov/mmwr/pdf/rr/rr6207.pdf

Influenza Vaccination Schedule

- Annual vaccination for persons 6 months of age and older without contraindications or precautions
- IIV dosage varies by age
  - 6 months through 35 months 0.25 mL
  - 3 years and older 0.5 mL
- Administer 1 dose per season to persons 9 years of age and older
- Some children 6 months through 8 years of age will need 2 doses

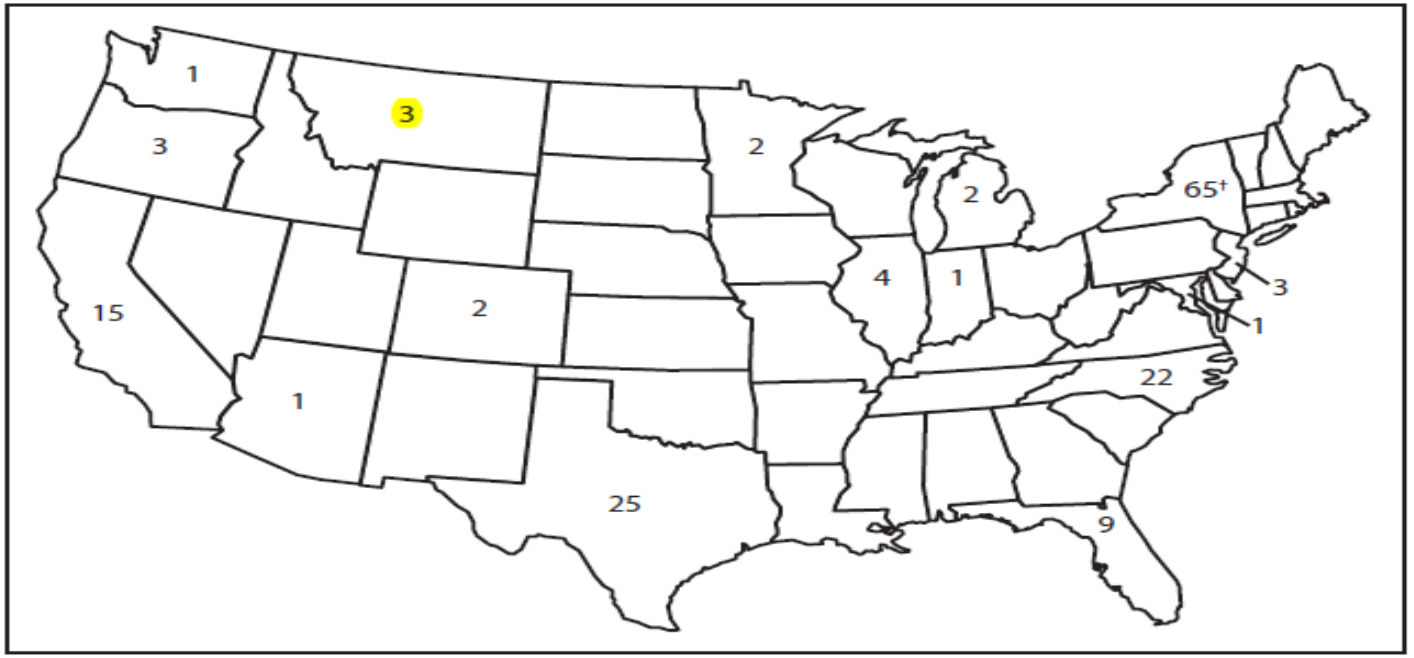


MEASLES, MUMPS, AND RUBELLA VACCINATION

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm

Measles Cases per State – U.S. 2013

FIGURE 2. Number of measles cases (N = 159), by state — United States, 2013*



* As of August 24, 2013.
† Includes New York City.

The three measles cases indicated for Montana should instead be indicated for Missouri. http://www.cdc.gov/mmwr/pdf/wk/mm6236.pdf

Columbus, Ohio • Apr 08, 2014 • 51° Partly Cloudy

The Columbus Dispatch

Ohio mumps outbreak sickens 153, including baby

LOCAL

Commissioners investigating dog shelter abuse complaints

Columbus approves food trucks on city streets

New changes for Columbus school's gifted kids put on hold

Local barbers blending old-school styles with modern flair

Wendy's salad dressing to be reformulated without peanuts

On Restaurants | A sit-still Skyward Grille

New speed limit signs posted in Victorian Village, Harrison West

By Misti Crane

The Columbus Dispatch • Monday April 7, 2014 11:33 PM

The number of Ohioans sicke
State University climbed to 1

Meanwhile, OSU leaders and
Medical Center are preparing

Interim university President
advisory executive team last
spokeswoman Liz Cook said.

The group will "take a very ca
really try to determine next s
and the greater community,"

Cook said she did not know
requiring students to be vacc
other schools mandate vaccin
not.

public health

Measles At A Rock Concert Goes Viral In A Bad Way

by NANCY SHUTE

April 07, 2014 4:53 PM ET

This one's virus-free. Matthew Followill, Nathan Followill and Caleb Followill of Kings of Leon performed in Los Angeles in December.

Kevin Winter/Getty Images for Radio.com

If you went to see the Kings of Leon concert on March 28 in Seattle, let's hope you came home with nothing but great memories.

A young woman at that concert in Seattle has come down with measles, which can be spread for days by a person who's infected but not yet sick. That's bad news for the thousands of people who shared the concert hall with her, or were at the many other places she went that week.

And that's why the Washington State Department of Health has published the unidentified

Measles, United States, Jan.–Sept. 13, 2013
Source of Importations (N=47)

WHO Region	# of Cases	Countries
African	2	Ethiopia (2)
Eastern Mediterranean	8	Pakistan (6), Sudan (1), Turkey (1)
European	23	Germany (6), United Kingdom (4), Poland (4), Italy (2), Azerbaijan (1), Belgium (1), Israel, (1), Republic of Georgia (1), Ukraine (2), Europe (1)
Americas	1	Mexico*
Southeast Asia	7	India (3), Indonesia (2), Korea (1), Thailand (1)
Western Pacific	6	China (6)

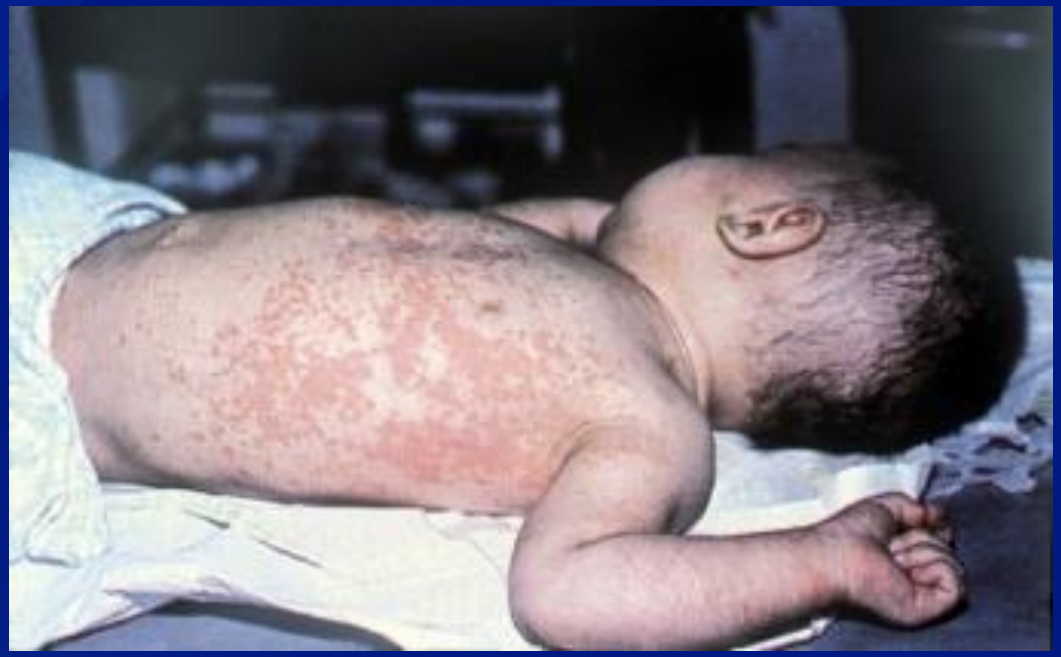
*Likely acquired disease at a resort frequented by international tourists
CDC unpublished data

Quick Look @ Measles

- **Highly contagious viral illness**
  - The most communicable disease
  - 10 times more communicable than influenza
- **Respiratory/airborne transmission**
  - Stays aloft for 2 hours
- **Communicability: 4 days before to 4 days after rash onset**
- **No available antiviral treatment**

Measles Can Look Like Many Other Diseases

1. Kawasaki Disease
2. Adenovirus
3. Parainfluenza/RSV
4. Other resp. viruses
5. Scarlet fever (GrA Strep)
6. Drug eruptions
7. Erythema multiforme
8. Rubella
9. Varicella
10. Rocky Mtn. Sp. Fever
11. Fifth Disease
12. Roseola
13. Enterovirus – esp. w/ aphthous stomatitis
14. Infectious Mono



Kawasaki Disease

Courtesy of P. Stinchfield, Children's Hospital of Minnesota

Measles, Mumps, Rubella Vaccine

- **Administer 1 dose of MMR to:**
  - Adults born in 1957 or later unless they have a medical contraindication to the vaccine or laboratory evidence of immunity to each of the three diseases
- **A routine second dose of MMR vaccine is recommended for adults who:**
  - Are students in postsecondary educational institutions
  - Work in a healthcare facility or
  - Plan to travel internationally
- **Adults born before 1957 are generally considered immune to measles and mumps**

Presumptive Evidence of Immunity

- **Acceptable evidence of immunity**
  - Documentation of age-appropriate MMR vaccination
  - Laboratory evidence of immunity
  - Laboratory confirmation of disease
  - Birth before 1957*
- **Removed physician-diagnosed disease as an acceptable criterion for evidence of immunity for measles and mumps**

***Except for rubella in women of childbearing age who may be pregnant**

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm

What Do You Think?

- **We have a HCP with 2 documented doses of MMR vaccine. We drew titers and they came back negative. Should we administer MMR vaccine?**
  - Yes
  - No

HCP and MMR Vaccination

- **Documented age-appropriate vaccination supersedes the results of subsequent serologic testing**
  - Vaccinated HCP are considered to be immune regardless of the results of subsequent serologic testing
- **ACIP does not recommend more than 2 doses of MMR for anyone with documentation of vaccination**

MMWR 2011;60(No.7)

Unvaccinated HCP

- **Vaccinate unvaccinated HCP with 2 doses of MMR who**
  - do not have documentation of MMR vaccination and
  - whose serologic test is interpreted as "indeterminate" or "equivocal"
- **ACIP does not recommend serologic testing after vaccination.**

MMWR 2011;60(No.7)

Updated Recommendations for Use of Tetanus Toxoid, Reduced Diphtheria Toxoid, and Acellular Pertussis (Tdap) Vaccine in Adults Aged 65 Years and Older — Advisory Committee on Immunization Practices (ACIP), 2012

Since 2005, the Advisory Committee on Immunization Practices (ACIP) has recommended a tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccine booster dose for all adolescents aged 11 through 18 years (preferred at 11 through 12 years) and for those adults aged 19 through 64 years who have not yet received a dose (*1*,*2*). In October 2010, despite the lack of an approved Tdap vaccine for adults aged 65 years and older, ACIP recommended that unvaccinated adults aged 65 years and older be vaccinated with Tdap if in close contact with an infant, and that other adults aged 65 years and older may receive Tdap (*3*). In July 2011, the Food and Drug Administration (FDA) approved expanding the age indication for Boostrix (GlaxoSmithKline Biologicals, Rixensart, Belgium) to aged 65 years and older (*4*). In February 2012, ACIP recommended Tdap for all adults aged 65 years and older. This recommendation supersedes previous Tdap recommendations regarding adults aged 65 years and older.

The Pertussis Vaccines Work Group of ACIP reviewed the epidemiology of pertussis in adults aged 65 years and older and two cost-effectiveness models to assess the epidemiologic and economic impact of pertussis vaccination in this population. The Work Group also considered safety and immunogenicity data from clinical trials and observational studies on the use of Tdap in adults aged 65 years and older (*3*).

The two Tdap vaccines available in the United States, Boostrix and Adacel (Sanofi Pasteur, Toronto, Canada), differ in composition and approved age for use (Table). Only Boostrix is approved for adults aged 65 years and older; however, ACIP discussed the use of Adacel in this age group. On February 22, 2012, ACIP approved use of Tdap for all adults aged 65 years and older. This report summarizes data considered and conclusions made by ACIP and provides guidance for implementing the recommendation.

The Pertussis Vaccines Work Group of ACIP reviewed the epidemiology of pertussis in adults aged 65 years and older and two cost-effectiveness models to assess the epidemiologic and economic impact of pertussis vaccination in this population. The Work Group also considered safety and immunogenicity data from clinical trials and observational studies on the use of Tdap in adults aged 65 years and older (*3*). The Work Group then presented policy options for consideration to the full ACIP.

Morbidity and Mortality Weekly Report

Updated Recommendations for Use of Tetanus Toxoid, Reduced Diphtheria Toxoid, and Acellular Pertussis Vaccine (Tdap) in Pregnant Women — Advisory Committee on Immunization Practices (ACIP), 2012

In October 2011, in an effort to reduce the burden of pertussis in infants, the Advisory Committee on Immunization Practices (ACIP) recommended that unvaccinated pregnant women receive a dose of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) (*1*). Vaccination of women with Tdap during pregnancy is expected to provide some protection to infants from pertussis until they are old enough to be vaccinated themselves. Tdap given to pregnant women will stimulate the development of maternal antipertussis antibodies, which will pass through the placenta, likely providing the newborn with protection against pertussis in early life, and will protect the mother from pertussis around the time of delivery, making her less likely to become infected and transmit pertussis to her infant (*1*). The 2011 Tdap recommendation did not call for vaccinating pregnant women previously vaccinated with Tdap. On October 24, 2012, ACIP voted to recommend use of Tdap during every pregnancy. This report summarizes data considered and conclusions made by ACIP and provides guidance for implementing its recommendations. These updated recommendations on use of Tdap in pregnant women aim to optimize strategies for preventing pertussis morbidity and mortality in infants.

ACIP is chartered as a federal advisory committee to provide expert external advice and guidance to the Director of the Centers for Disease Control and Prevention (CDC) on use of vaccines and related agents for the control of vaccine-preventable diseases in the civilian population of the United States. Recommendations for routine use of vaccines in children and adolescents are harmonized to the greatest extent possible with recommendations made by the American Academy of Pediatrics, the American Academy of Family Physicians (AAFP), and the American College of Obstetricians and Gynecologists. Recommendations for routine use of vaccines in adults are reviewed and approved by the American College of Physicians, AAFP, the American College of Obstetricians and Gynecologists, and the American College of Nurse-Midwives. ACIP recommendations adopted by the CDC Director become agency guidelines on the date published in the *Morbidity and Mortality Weekly Report* (*MMWR*).

The United States has experienced substantial increases in reported pertussis cases over the past several years. Provisional case counts for 2012 have surpassed the last peak year, 2010, with 41,880 pertussis cases and 14 deaths in infants aged <12 months (*2*) (CDC, unpublished data, 2012). To reduce this burden, optimizing the current vaccination program and protecting infants who are at highest risk for death are immediate priorities. Since the 2011 ACIP vaccination recommendation, uptake of Tdap among pregnant women has been low; one survey of 1,231 women (August 2011 to April 2012) estimated that only 2.6% of women received Tdap during their recent pregnancy (*3*). New data indicate that maternal antipertussis antibodies are short-lived; therefore, Tdap vaccination in one pregnancy will not provide high levels of antibodies to protect newborns during subsequent pregnancies (*4*).

Methods

In monthly teleconferences during 2012, the ACIP Pertussis Vaccines Work Group considered published, peer-reviewed literature and unpublished data relevant to vaccinating pregnant women with Tdap. When data were not available, expert opinion was considered. Summaries of the data reviewed and work group discussions were presented to ACIP before recommendations were proposed. The proposed Tdap recommendation for pregnant women was presented at the October 2012 ACIP meeting and approved by ACIP.

Summary of ACIP Deliberations and Rationale

A dose of Tdap during each pregnancy

Very young infants are dependent solely on maternal antibodies and lack the ability to mount a cell-mediated response (*4*). The effectiveness and optimal concentration of maternal antipertussis antibodies in newborns are not yet known, but high levels of antibodies in the first weeks after birth likely confer protection and might prevent pertussis or modify disease severity (*5*–*7*). Studies on the persistence of antipertussis antibodies following a dose of Tdap show antibody levels in healthy, nonpregnant adults peak during the first month after vaccination, with substantial antibody decay after 1 year (*8*–*10*). Antibody kinetics in pregnant women likely would be similar. One study evaluated persistence of maternal

MMWR / February 22, 2013 / Vol. 62 / No. 7 131

PERTUSSIS VACCINATION AND PREGNANT WOMEN

http://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/tdap-td.html

ACIP Conclusions Tdap and Pregnancy

- Maternal antibodies from women immunized before pregnancy waned quickly (Healy 2012)
  - Concentration of maternal antibodies unlikely high enough to provide passive protection to infants
- A single dose of Tdap during one pregnancy is insufficient to provide protection for subsequent pregnancies

ACIP Conclusions
Tdap for Every Pregnancy

- Data reassuring on safety of 2 doses of Tdap and multiple doses of tetanus toxoid-containing vaccines
  - ~5% of women would receive 4 or more doses of Tdap
- ACIP concluded experience with tetanus toxoid-containing vaccines suggests no excess risk for severe adverse events for women receiving Tdap with every pregnancy
- Supported ongoing safety monitoring and requested CDC perform safety studies to address concerns about potential increase in severe adverse events after Tdap is given during subsequent pregnancies

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6207a4.htm

Tdap and Pregnancy

- Administer Tdap to pregnant women during each pregnancy, regardless of previous Tdap vaccination history*
- Ideally vaccinate between 27 through 36 weeks gestation although Tdap may be given at any time during pregnancy
  - 27 through 36 weeks gestation is optimal timing to maximize the maternal antibody response AND passive antibody transfer to the infant

*ACIP off-label recommendation; *MMWR*. Vol. 62 No. 7; Feb, 22, 2013

Tdap and Postpartum Women

- Postpartum women *not previously vaccinated* should be vaccinated immediately
  - Including women who are breastfeeding
- Do not administer Tdap to postpartum women who have already been vaccinated with Tdap
  - Regardless of the length of time since Tdap vaccination

Special Situations and Pregnant Women

- Unknown or incomplete tetanus vaccination: Should complete the 3-dose primary series
  - Recommended schedule is 0, 4 weeks, and 6 through 12 months
  - Tdap should replace 1 dose of Td, preferably between 27- 36 weeks gestation
- Wound care: Previously unvaccinated pregnant woman should be given Tdap if Td is indicated for wound management

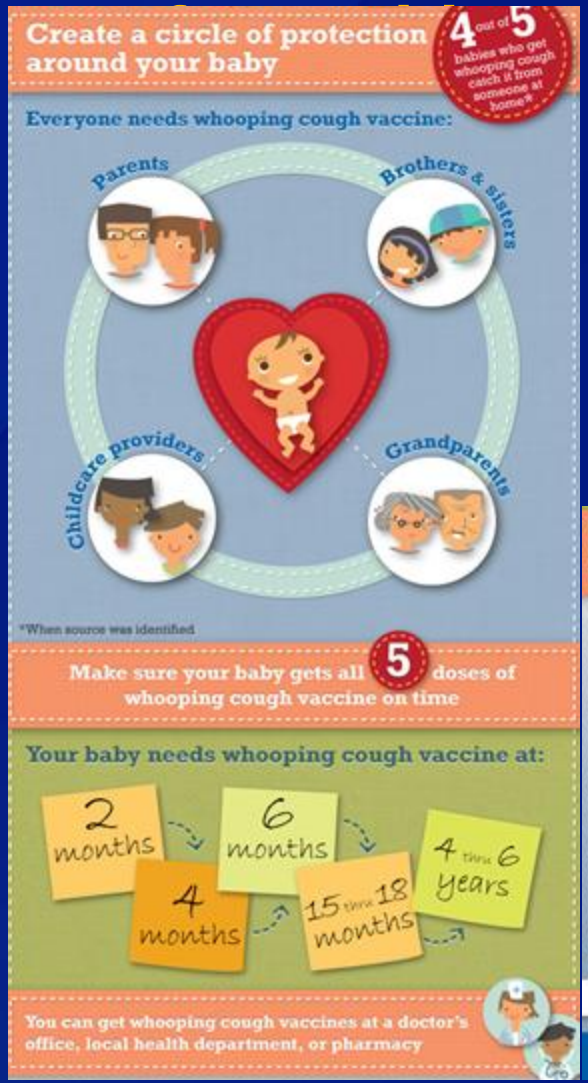
*ACIP off-label recommendation; *MMWR.* Vol. 62 No. 7; February 22, 2013 and MMWR 2011:60((No.41): 11424-1426

Barriers to Vaccinating Pregnant Women with Tdap

- Undocumented Tdap vaccination history
  - Provider hesitancy to vaccinate
- Programs still focused on postpartum Tdap
- Getting the message out
  - Several initiatives aimed at improving vaccination of pregnant women
- Provider recommendation is the best predictor of vaccination (Tong 2008, Meharry 2012)

Tong A, et al. A cross-sectional study of maternity care providers' and women's knowledge, attitudes, and behaviours towards influenza vaccination during pregnancy. MJ Obstet Gynaecol Can. 2008 May;30(5):404-10.
Meharry et al. Reasons Why Women Accept or Reject the Trivalent Inactivated Influenza Vaccine (TIV) During PregnancyMatern Child Health J. 2012 Feb 25.

Protect Babies from Whooping Cough



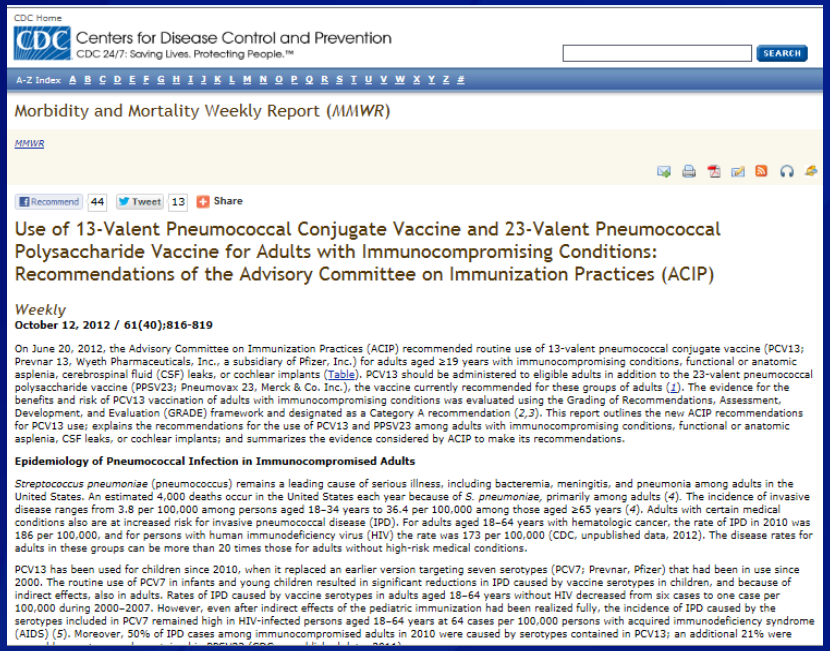
http://www.cdc.gov/vaccines/parents/infographics/protect-babies-from-whooping-cough.html

What Would You Do?

- Your patient just delivered her first child. She was previously vaccinated with Tdap as an adolescent. She did not receive Tdap during this pregnancy. Should you administer Tdap vaccine prior to discharge?
  - Yes – text CDC2Y to 22333
  - No – text CDC2N to 22333

Note: Message and Data Rates May Apply

Results



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Morbidity and Mortality Weekly Report (*MMWR*)

MMWR

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Use of 13-Valent Pneumococcal Conjugate Vaccine and 23-Valent Pneumococcal Polysaccharide Vaccine for Adults with Immunocompromising Conditions: Recommendations of the Advisory Committee on Immunization Practices (ACIP)

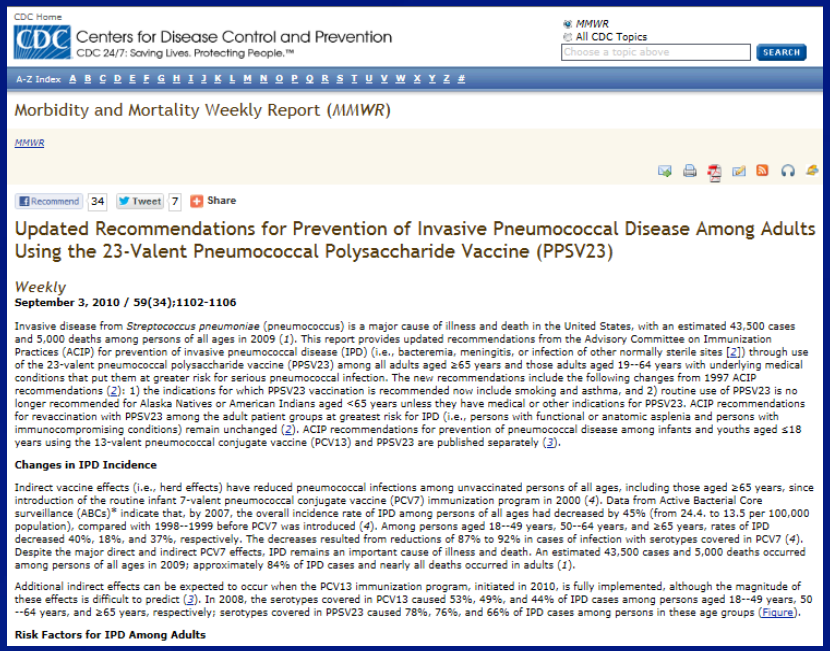
Weekly
October 12, 2012 / 61(40);816-819

On June 20, 2012, the Advisory Committee on Immunization Practices (ACIP) recommended routine use of 13-valent pneumococcal conjugate vaccine (PCV13; Prevnar 13, Wyeth Pharmaceuticals, Inc., a subsidiary of Pfizer, Inc.) for adults aged ≥19 years with immunocompromising conditions, functional or anatomic asplenia, cerebrospinal fluid (CSF) leaks, or cochlear implants (Table). PCV13 should be administered to eligible adults in addition to the 23-valent pneumococcal polysaccharide vaccine (PPSV23; Pneumovax 23, Merck & Co. Inc.), the vaccine currently recommended for these groups of adults (1). The evidence for the benefits and risk of PCV13 vaccination of adults with immunocompromising conditions was evaluated using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) framework and designated as a Category A recommendation (2,3). This report outlines the new ACIP recommendations for PCV13 use; explains the recommendations for the use of PCV13 and PPSV23 among adults with immunocompromising conditions, functional or anatomic asplenia, CSF leaks, or cochlear implants; and summarizes the evidence considered by ACIP to make its recommendations.

Epidemiology of Pneumococcal Infection in Immunocompromised Adults

Streptococcus pneumoniae (pneumococcus) remains a leading cause of serious illness, including bacteremia, meningitis, and pneumonia among adults in the United States. An estimated 4,000 deaths occur in the United States each year because of *S. pneumoniae*, primarily among adults (4). The incidence of invasive disease ranges from 3.8 per 100,000 among persons aged 18–34 years to 36.4 per 100,000 among those aged ≥65 years (4). Adults with certain medical conditions also are at increased risk for invasive pneumococcal disease (IPD). For adults aged 18–64 years with hematologic cancer, the rate of IPD in 2010 was 186 per 100,000, and for persons with human immunodeficiency virus (HIV) the rate was 173 per 100,000 (CDC, unpublished data, 2012). The disease rates for adults in these groups can be more than 20 times those for adults without high-risk medical conditions.

PCV13 has been used for children since 2010, when it replaced an earlier version targeting seven serotypes (PCV7; Prevnar, Pfizer) that had been in use since 2000. The routine use of PCV7 in infants and young children resulted in significant reductions in IPD caused by vaccine serotypes in children, and because of indirect effects, also in adults. Rates of IPD caused by vaccine serotypes in adults aged 18–64 years without HIV decreased from six cases to one case per 100,000 during 2000–2007. However, even after indirect effects of the pediatric immunization had been realized fully, the incidence of IPD caused by the serotypes included in PCV7 remained high in HIV-infected persons aged 18–64 years at 64 cases per 100,000 persons with acquired immunodeficiency syndrome (AIDS) (5). Moreover, 50% of IPD cases among immunocompromised adults in 2010 were caused by serotypes contained in PCV13; an additional 21% were



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Morbidity and Mortality Weekly Report (*MMWR*)

MMWR

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Updated Recommendations for Prevention of Invasive Pneumococcal Disease Among Adults Using the 23-Valent Pneumococcal Polysaccharide Vaccine (PPSV23)

Weekly
September 3, 2010 / 59(34);1102-1106

Invasive disease from *Streptococcus pneumoniae* (pneumococcus) is a major cause of illness and death in the United States, with an estimated 43,500 cases and 5,000 deaths among persons of all ages in 2009 (1). This report provides updated recommendations from the Advisory Committee on Immunization Practices (ACIP) for prevention of invasive pneumococcal disease (IPD) (i.e., bacteremia, meningitis, or infection of other normally sterile sites [2]) through use of the 23-valent pneumococcal polysaccharide vaccine (PPSV23) among all adults aged ≥65 years and those adults aged 19--64 years with underlying medical conditions that put them at greater risk for serious pneumococcal infection. The new recommendations include the following changes from 1997 ACIP recommendations (2): 1) the indications for which PPSV23 vaccination is recommended now include smoking and asthma, and 2) routine use of PPSV23 is no longer recommended for Alaska Natives or American Indians aged <65 years unless they have medical or other indications for PPSV23. ACIP recommendations for revaccination with PPSV23 among the adult patient groups at greatest risk for IPD (i.e., persons with functional or anatomic asplenia and persons with immunocompromising conditions) remain unchanged (2). ACIP recommendations for prevention of pneumococcal disease among infants and youths aged ≤18 years using the 13-valent pneumococcal conjugate vaccine (PCV13) and PPSV23 are published separately (3).

Changes in IPD Incidence

Indirect vaccine effects (i.e., herd effects) have reduced pneumococcal infections among unvaccinated persons of all ages, including those aged ≥65 years, since introduction of the routine infant 7-valent pneumococcal conjugate vaccine (PCV7) immunization program in 2000 (4). Data from Active Bacterial Core surveillance (ABCs)* indicate that, by 2007, the overall incidence rate of IPD among persons of all ages had decreased by 45% (from 24.4. to 13.5 per 100,000 population), compared with 1998--1999 before PCV7 was introduced (4). Among persons aged 18--49 years, 50--64 years, and ≥65 years, rates of IPD decreased 40%, 18%, and 37%, respectively. The decreases resulted from reductions of 87% to 92% in cases of infection with serotypes covered in PCV7 (4). Despite the major direct and indirect PCV7 effects, IPD remains an important cause of illness and death. An estimated 43,500 cases and 5,000 deaths occurred among persons of all ages in 2009; approximately 84% of IPD cases and nearly all deaths occurred in adults (1).

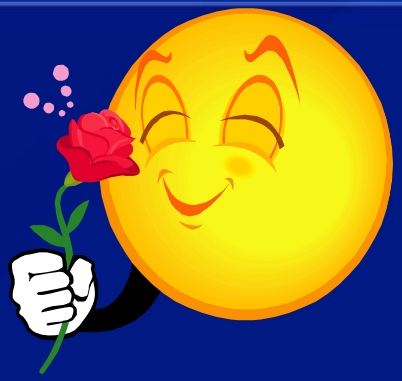
Additional indirect effects can be expected to occur when the PCV13 immunization program, initiated in 2010, is fully implemented, although the magnitude of these effects is difficult to predict (3). In 2008, the serotypes covered in PCV13 caused 53%, 49%, and 44% of IPD cases among persons aged 18--49 years, 50--64 years, and ≥65 years, respectively; serotypes covered in PPSV23 caused 78%, 76%, and 66% of IPD cases among persons in these age groups (Figure).

Risk Factors for IPD Among Adults

PNEUMOCOCCAL VACCINES

http://www.cdc.gov/vaccines/pubs/ACIP-list.htm#pcv

Immunization Poetry Corner



PPSV23

Never for infants

One for sick, two, weak defense

All at sixty-five

PCV13

Infants need four

Adults, weak defense, just one

Others, wait and see

Dr. Matthew Moore, MD, MPH, Center for Disease Control and Prevention, NFID Clinical Vaccinology Conference 2014

Comparing Pneumococcal Vaccines

	Pneumococcal Conjugate Vaccine	Pneumococcal Polysaccharide Vaccine
Brand Name	Prevnar13	Pneumovax
ACIP Abbrev	PCV13	PPSV23
Effect against bacteremia	Substantial	Substantial
Effect against carriage	None	Substantial
Serogroups	13	23
Ages	6 weeks and older*	2 years of age and older
Route	Intramuscular injection (IM)	~~Intramuscular (IM) or subcutaneous (subcut) injection~~

*ACIP off-label recommendation for PCV13 for adults 19 through 49 years of age

Administering PCV13 and PPSV23 Vaccines General Rules

- **PCV13 and PPSV23 should not be administered during the same clinic visit**
  - Either vaccine may be administered with other vaccines
- **Administer PCV13 before PPSV23 whenever possible**
- **Important intervals between PPSV23 and PCV13**
  - If PCV13 is administered first, wait 8 weeks to administer PPSV23
  - If PPSV23 is administered first, wait at least:
    - 8 weeks to administer PCV13 for children ages 2 through 18 years
- **There should be at least 5 years between doses of PPSV23**

PCV13 and PPSV23 for High-risk Adults 19 Years and Older*

- Administer a single dose of PCV13 to pneumococcal naïve adults with immunocompromising conditions, including:
  - Functional or anatomic asplenia, including sickle cell
  - Chronic renal failure and nephrotic syndrome
  - CSF leak
  - Cochlear implants
- Followed by a dose of PPSV23 at least 8 weeks later
- High-risk adults who have previously received one or more doses of PPSV23 should receive a dose of PCV13 one or more years after the last PPSV23 dose was received

*ACIP off-label recommendation for PCV13 for adults 19 through 49 years of age

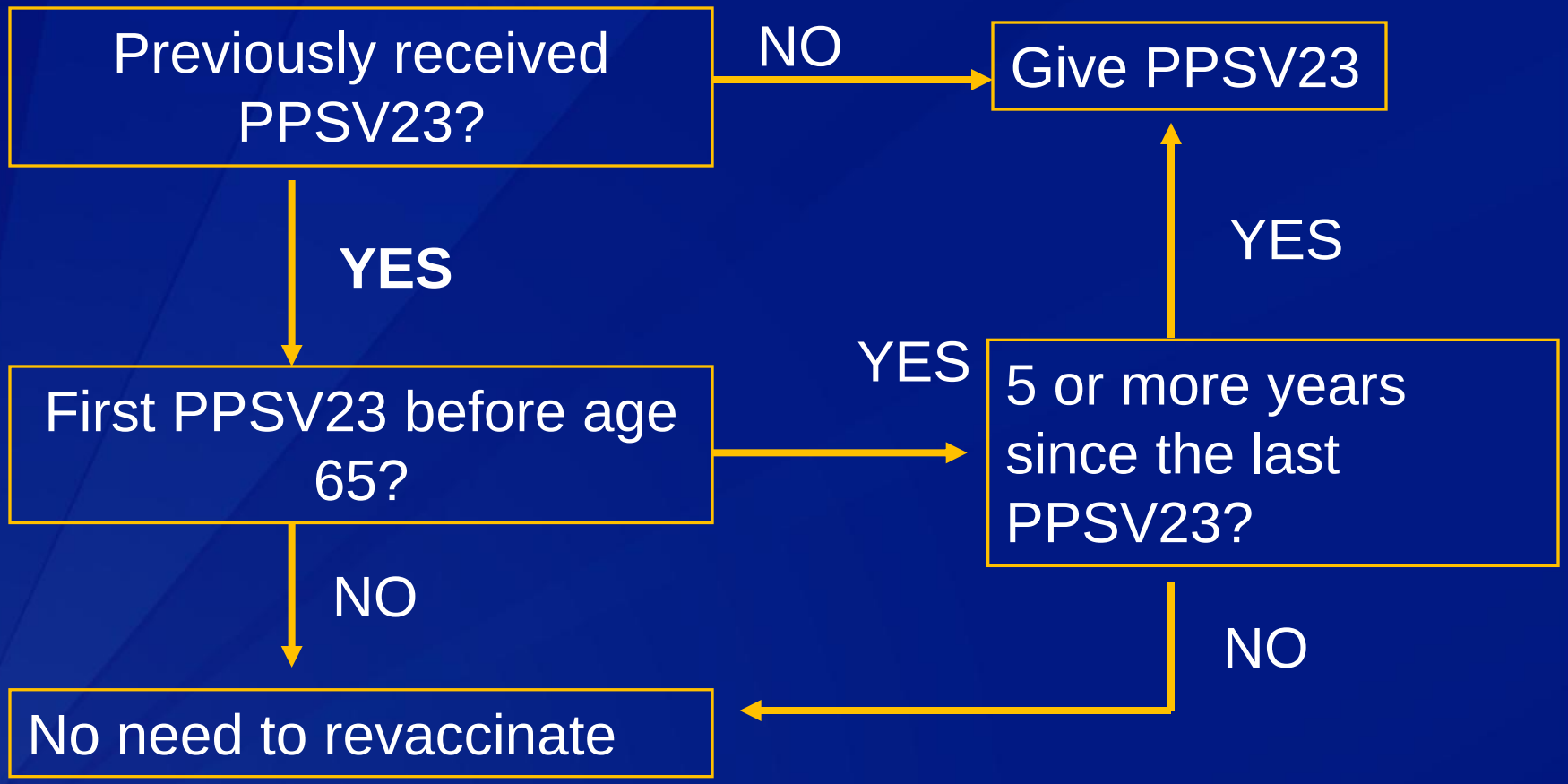
PPSV23 Second Dose for Adults 19 through 64 Years of Age

- Administer a second dose of PPSV23 at least 5 years after first dose of PPSV23 and at least 8 weeks after a dose of PCV13 to high-risk adults 19 through 64 years of age with:
  - Functional or anatomic asplenia, including sickle cell disease
  - Chronic renal failure or nephrotic syndrome
  - Immunocompromising conditions, including:
    - HIV, leukemia, lymphoma, Hodgkin's disease, multiple myeloma, generalized malignancy
    - Immunosuppressive therapy (e.g., long-term systemic corticosteroids or radiation therapy)
    - Organ or bone marrow transplant
- Does NOT apply to CSF leak or cochlear implant

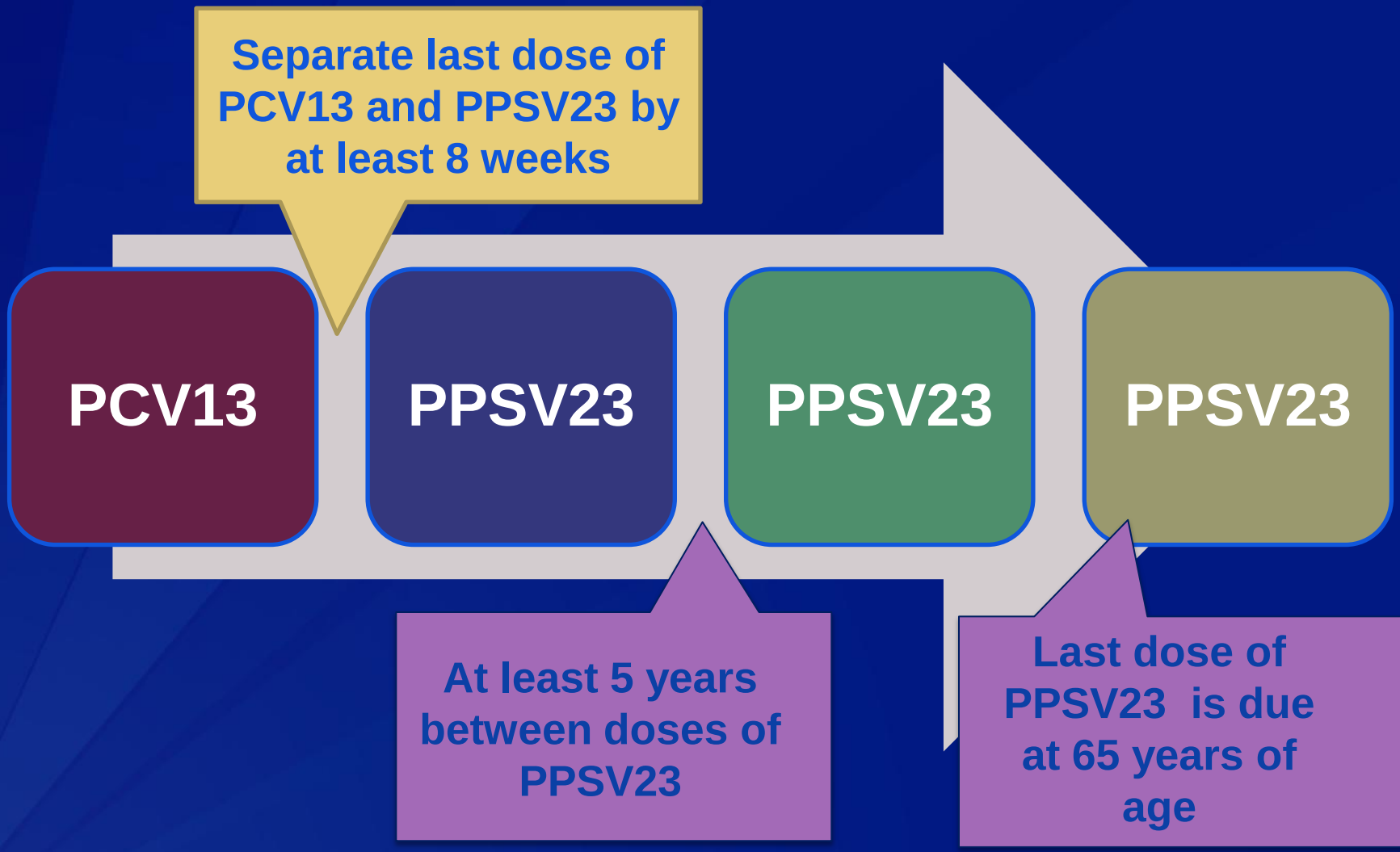
PPSV23 for Adults 65 Years of Age and older

- Persons who received PPSV23 before age 65 years for any indication should receive another dose at age 65 or older if at least 5 years have passed since previous dose and 8 weeks since a dose of PCV13
- Those vaccinated with PPSV23 at or after age 65 do not need any additional doses

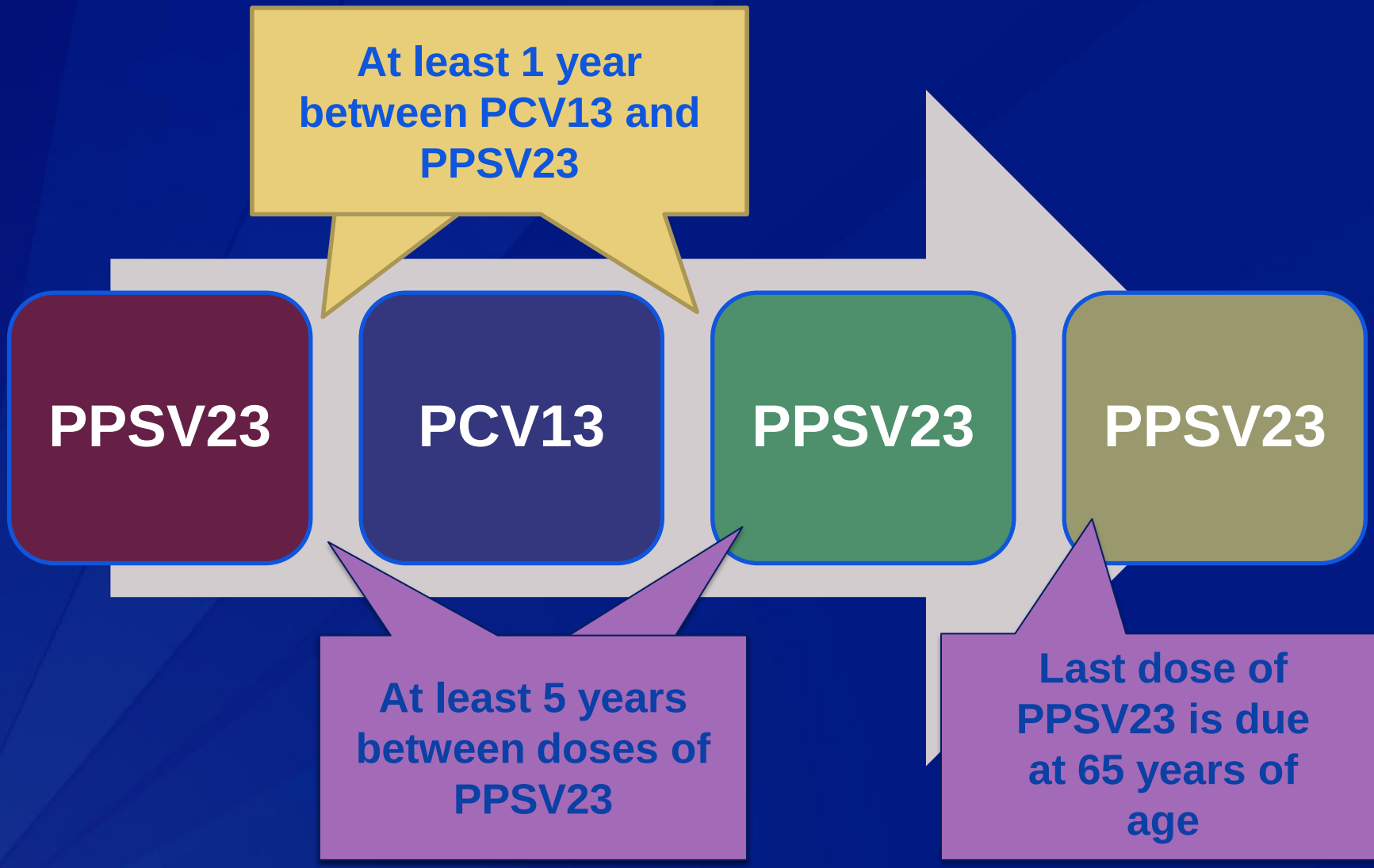
ACIP Recommendations for Revaccination of Persons 65 Years of Age and Older



Previously Unvaccinated Asplenic Adult



Previously Unvaccinated Asplenic Adult



Pneumococcal Vaccination Recommendations for Children[1] and Adults by Age and/or Risk Factor

Risk Group	Underlying medical condition or other risk factor	Recommendations for Vaccination with Pneumococcal Conjugate Vaccine (PCV13)			Recommendations for Vaccination with Pneumococcal polysaccharide vaccine (PPSV23)		
		Administer doses needed to complete schedule to children through age 71 months	*Consider* administering 1 dose to PCV13-naïve children age 6–18 years	Administer 1 dose to PCV13-naïve adults age 19 years and older	Administer 1 dose at age 2 through 64 years	Administer second dose 5 years after first dose if age <65 years	Administer 1 dose at age 65 years
Immuno-competent	Healthy adult, non-smoker						X
	Chronic heart disease[2]	X			X		X
	Chronic lung disease[3]	X			X		X
	Diabetes mellitus	X			X		X
	Cerebrospinal fluid leak	X	X	X	X		X
	Cochlear implant	X	X	X	X		X
	Alcoholism				X		X
	Chronic liver disease, cirrhosis				X		X
	Cigarette smoking (≥19 yrs)				X		X
Functional or anatomic asplenia	Sickle cell disease/other hemoglobinopathy	X	X	X	X	X	X
	Congenital or acquired asplenia	X	X	X	X	X	X
Immuno-compromised	Congenital or acquired immunodeficiency[4]	X	X	X	X	X	X
	HIV	X	X	X	X	X	X
	Chronic renal failure	X	X	X	X	X	X
	Nephrotic syndrome	X	X	X	X	X	X
	Leukemia	X	X	X	X	X	X
	Lymphoma	X	X	X	X	X	X
	Hodgkin disease	X	X	X	X	X	X
	Generalized malignancy	X	X	X	X	X	X
	Iatrogenic immunosuppression[5]	X	X	X	X	X	X
	Solid organ transplant	X	X	X	X	X	X
	Multiple myeloma	X	X	X	X	X	X

Technical content reviewed by the Centers for Disease Control and Prevention

IMMUNIZATION ACTION COALITION

1573 Selby Avenue • St. Paul, MN 55104 • 651 647-9009 • www.immunize.org • www.vaccineinformation.org

www.immunize.org/catg.d/p2019.pdf • Item #P2019 (2/13)

1. For PCV13 vaccination of healthy children, see "Recommendations for Pneumococcal Vaccine Use in Children" at www.immunize.org/catg.d/p2016.pdf.
2. Particularly cyanotic congenital heart disease and cardiac failure in children; excluding hypertension in adults.
3. Including asthma in children if treated with high-dose oral corticosteroid therapy; including asthma in adults.
4. Includes B- (humoral) or T-lymphocyte deficiency, complement deficiencies (particularly C1, C2, C3, and C4 deficiencies), and phagocytic disorders (excluding chronic granulomatous disease).
5. Diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids and radiation therapy.

http://www.immunize.org/catg.d/p2019.pdf

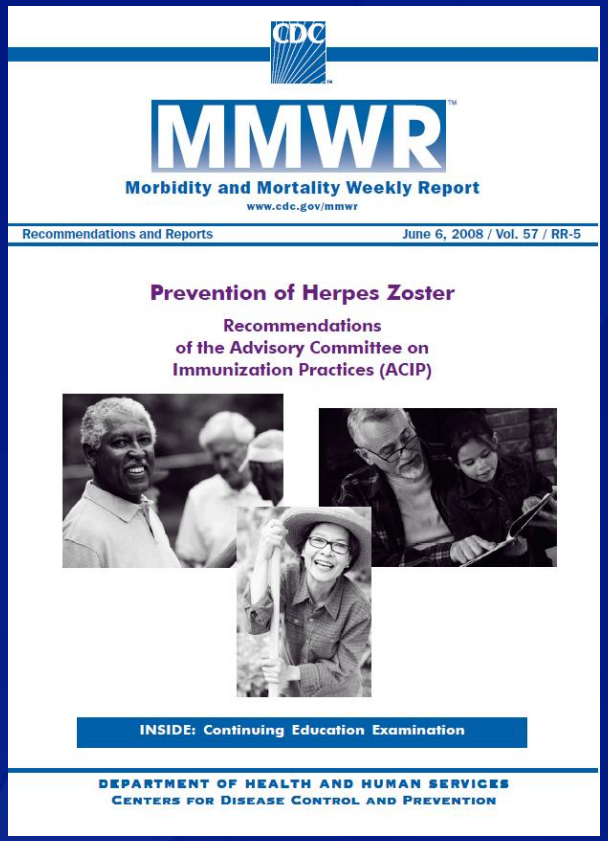
What Would You Do?

- A 66-year-old patient has had laboratory confirmed pneumococcal pneumonia. She has never been vaccinated with PPSV23.

  Should PPSV23 be administered?

  - Yes
  - No

Note: Message and Data Rates May Apply



ZOSTER VACCINATION

http://www.cdc.gov/mmwr/PDF/rr/rr5705.pdf

Zoster Vaccine

- FDA licensed for adults 50-59 years of age
- Routine vaccination of adults younger than 60 years NOT recommended by ACIP
- Rationale
  - Reduced supply
  - Burden of complications highest in persons older than 60 years

ACIP Recommendations for Zoster Vaccine

- Adults 60 years and older should receive a single dose of zoster vaccine
- Need for booster dose or doses not known at this time
- A history of herpes zoster should not influence the decision to vaccinate

MMWR 2008;57(RR-5)

Zoster Vaccine

- It is not necessary to inquire about chickenpox or test for varicella immunity before administering zoster vaccine
- Persons 60 years of age and older can be assumed to be immune* regardless of their recollection of chickenpox

MMWR 2008;57(RR-5)

*For the purpose of establishing eligibility for zoster vaccine

IMMUNIZATION RESOURCES

CDC Vaccines and Immunization Resources

- Questions? E-mail CDC:
  - Providers — nipinfo@cdc.gov
  - Parents and patients — www.cdc.gov/cdcinfo
- Website — ww.cdc.gov/vaccines
- Influenza — www.cdc.gov/flu
- Vaccine Safety — w.cdc.gov/vaccinesafety

Additional Resources

- Arizona Department of Health Services
  http://azdhs.gov/phs/immunization/
- Local Health Departments
- Immunization Action Coalition www.immunize.org
- Vaccine Education Center www.chop.edu
- American Academy of Pediatrics (AAP) www.aap.org/immunize
- National Foundation for Infectious Diseases (NFID) www.nfid.org

Act as if what you do makes a difference.
It does.

William James

JoEllen Wolicki BSN, RN
jwolicki@cdc.gov

OPTIONAL

Meningococcal Vaccines For Adults 56 Years of Age and Older

- **Previously unvaccinated adults 56 years of age and older with increased risk of disease**
  - Polysaccharide vaccine if traveling or at risk due to an outbreak
  - 2 doses of conjugate vaccine if asplenic, or complement component deficiency
- **Adult 56 years of age and older who has previously received conjugate vaccine, give conjugate as booster dose**

*ACIP off-label recommendation
http://www.cdc.gov/mmwr/PDF/rr/rr6202.pdf

Meningococcal Vaccination of High-Risk Persons 56 Years of Age and Older

- MPSV4 is only licensed vaccine for persons in this age group
- MPSV4 is preferred for meningococcal vaccine-naïve persons aged 56 years and older who anticipate requiring a single dose of meningococcal vaccine (e.g., travelers and persons at risk as a result of a community outbreak
- *For persons now aged 56 years of age and older who were vaccinated previously with MCV4 and are recommended for revaccination or for whom multiple doses are anticipated (e.g., persons with asplenia and microbiologists), MCV4* is preferred*

*ACIP off-label recommendation
http://www.cdc.gov/mmwr/PDF/rr/rr6202.pdf

Meningococcal Booster Vaccination for Those At Continued Risk

- Persons who remain at increased risk and completed the primary dose or series at age:
  - 2 mos.–6 yrs.: Should receive additional dose of either MCV4
    - 3 yrs. after primary immunization; boosters should be repeated every 5 yrs. thereafter
  - 7 yrs. and older: Should receive additional dose of either MCV4
    - 5 yrs. after primary immunization; boosters should be repeated every 5 yrs. thereafter

*ACIP off-label recommendation

Serogroup B Vaccines Under Development

- **Novel approach: Protein-based vaccines**
  - Serogroup B polysaccharide poorly immunogenic in humans
  - Homologous to human neural cell adhesion molecule
  - Protein antigen must provide protection against diverse strains
- **Two vaccines under development**
  - Both utilize surface-exposed proteins that are important for survival of the organism, expressed on majority of strains
  - Antibody to protein demonstrated to be bactericidal
- **Multi-dose series, even in adolescents**
  - Immune response not as robust compared to polysaccharide vaccines
  - Vaccines are safe, but more reactogenic than conjugate vaccines

Healthcare Associated Measles Outbreak, Arizona, 2008

- 14 cases, 7 were acquired in hospital settings (EDs, inpatient)
- One unvaccinated HCP acquired measles and infected a patient who required ICU care
- 25% of 7,195 HCPs lacked documented evidence of measles immunity
  - 139/1,583 (9%) of those tested were measles IgG neg
- Response costs in 2 affected hospitals was ~$800,000 or more than $100,000 per case investigated
- Major component of cost was vaccination and furloughs related to lack of readily available records on evidence of measles immunity

Chen SY et al JID 2011 203(11):1517-25